bound for a serial device coupled to RS-232 transceiver **218**. If not, then in step **918** the message is discarded. Otherwise, in step **920** the bytes of the message are sent to the UART associated with the Serial 2 interface of CPU **204**. In step **922**, the UART reformats the message into a serial bit stream. In step **924**, the serial bit stream is sent from the UART associated with the Serial 2 interface of CPU **204** to RS-232 transceiver **218**. In step **926**, transceiver **218** transmits the serial bit stream to the serial device coupled thereto via the TXD line of transceiver **218**. At step **928**, the algorithm ends, and returns to "Start" step **902**.

[**0156**] Turning to **FIG. 10, a** flow chart that illustrates one preferred embodiment of an algorithm to implement the optional RS-232 to J1587 interface is shown. The algorithm begins at step **1002**. In step **1004**, serial information from the serial device coupled to RS232 transceiver **218** enters transceiver **218** as a serial bit stream, and in step **1006** is immediately transferred to the UART associated with the Serial 2 interface of CPU **204**. The UART converts the serial bit stream to bytes, and stores the bytes in a buffer. In steps **1008-1010**, CPU **204** polls the UART in a continuous polling cycle. During each cycle, in step **1012** any new bytes are read and stored in a RAM associated with CPU **204**. Alternatively, CPU **204** may respond to an interrupt generated when data is received by the UART.

[**0157**] In step **1014**, CPU **204** assembles the bytes into messages, and in step **1016** it determines if a message is addressed to a J1587 node of vehicle communications network **108**. If not, then in step **1018** the message is discarded. Otherwise, in step **1020** CPU **204** reformats the message as one or more properly addressed J1587 data packets. In step **1022**, the J1587 data packets are sent to the UART associated with the Serial 1 interface of CPU **204**. In step **1024**, the J1587 data packets are sent to J1587 transceiver **216**. In step **1026**, transceiver **216** communicates the data packets to the appropriate node of vehicle communications network **108** via the J1587+ and J1587− lines coupled thereto, in accordance with the address of the data packet. At step **1028**, the algorithm ends, and returns to "Start" step **1002**.

[**0158**] Other embodiments of the present invention may also be implemented without departing from the scope of the claimed invention. For example, in one illustrative embodiment it may be desirable to include in USB adapter **200** capability for downloading the updated calibration software from a remote computer to a vehicle subsystem computer. For further example, this disclosure primarily discusses engine control computers. However, in other illustrative embodiments USB adapter **200** may be used to interface remote computers to other vehicle subsystems, such as applications involving transmissions , anti-lock braking systems, vehicle management computers, and the like.

[**0159**] In the disclosure above, it is noted that PCs generally run vehicle diagnostic software while PDAs generally run service tool software. However, this is not necessarily the case, and nothing in this disclosure should be read to limit the software which may be executed by any remote computer coupled to a vehicle communications network in accordance with the present invention. Furthermore, almost any computer having the necessary communications capabilities may be coupled to vehicle communications network **108** via USB adapter **200**, and nothing in this disclosure should be construed as implying otherwise.

[**0160**] The illustrative embodiments described herein are exemplary, and are not intended to limit the claimed invention in any way. Although certain applications are described as specifically well suited for use with the current invention, it is believed to be useful in other applications as well. In fact, there are few, if any, internal combustion engine applications in which the present invention would not offer some benefit. Engine and engine controller manufacturers may choose to include the present invention in all engines, irrespective of the application.

What is claimed is:

1. An adapter for allowing communications between a vehicle control computer coupled to a vehicle communications network and a remote computer, the adapter comprising:

a first interface configured for operatively coupling to the vehicle communications network; and

a second interface including a universal serial bus (USB) controller having a USB device port and a USB host port, the second interface configured for operatively coupling to the remote computer via the USB device port and the USB host port;

wherein the vehicle control computer and the remote computer communicate via the vehicle communications network and the first and second interfaces.

2. The adapter of claim 1, wherein the remote computer is a personal digital assistant having a USB device port, and wherein the USB device port of the personal digital assistant is operatively coupled to the USB host port of the universal serial bus controller.

3. The adapter of claim 2, wherein the remote computer comprises service tool software.

4. The adapter of claim 2, wherein the remote computer comprises vehicle diagnostic software.

5. The adapter of claim 1, wherein the remote computer is a personal computer having a USB host port, and wherein the USB host port of the personal computer is operatively coupled to the USB device port of the universal serial bus controller.

6. The adapter of claim 5, wherein the remote computer comprises service tool software.

7. The adapter of claim 5, wherein the remote computer comprises vehicle diagnostic software.

8. The adapter of claim 1, wherein the USB host port of the universal serial bus controller is configured for coupling with a plurality of remote computers, each of the plurality of remote computers having a USB device port.

9. The adapter of claim 8, wherein at least one of the plurality of remote computers comprises vehicle diagnostic or service tool software.

10. The adapter of claim 1, wherein the vehicle communications network comprises a J1939 network segment, and wherein the first interface of the adapter is operatively coupled to the J1939 network segment.

11. The adapter of claim 10, wherein messages communicated via the J1939 network segment are made available via the second interface.

12. The adapter of claim 11, wherein the remote computer is a personal digital assistant having a USB device port, the USB device port of the personal digital assistant is operatively coupled to the USB host port of the universal serial